

#### REMARKS

Applicants' attorney wishes to thank the Examiner for the careful consideration given to this case. The matters raised in the action are discussed below the same order as presented by the Examiner.

The rejection of claims 1 and 4 under 35 USC 103(a) as being unpatentable over Yoder (5,225,366) in view of Dreifus et al. (5,420,443) is in error and should be withdrawn.

Yoder does not use a SiC substrate, but rather, employs very different substrates. For example, see Yoder, column 9, lines 25 - 45, where monocrystalline substrates having lattice constants closely matched to that of diamond are discussed, and the use of copper is indicated. The lattice constant for diamond is 0.3567 nm. In accordance with the Yoder teachings, the use of copper having a lattice constant of 0.360 nm results in a lattice constant difference of less than 1%. In the case of boron nitride (lattice constant of c-BN is 0.362 nm), there is a coherence difference which is also less than 1%. In comparison, the lattice constant for  $\beta$ -SiC is 0.4358 nm and there is a 22% difference as compared with diamond. It is therefore submitted that one skilled in the art would not modify Yoder to use a SiC substrate contrary to its specific teachings.

It is further urged that each of claims 1 and 5 require a monoatomic substrate layer, not a bulk substrate. In respect to the electronic and chemical properties of this layer, it is noted that it is made of carbon atoms having the same configuration (i.e.  $sp^3$ ) as diamond.

In the case of Dreifus, there is no suggestion of a monoatomic and monocrystalline layer of diamond-type carbon formed on SiC. Dreifus teaches a diamond layer that tends towards a highly oriented structure while it thickens. The structure is close to a monocrystal and highly oriented via texture phenomenon which is associated with a selective growth of the formed crystals.

In distinction over these teachings, claims 1 and 5 each set forth a monoatomic layer which is formed on a SiC monocrystal whereas Dreifus teaches a 3D germination (a Wolmer-Weber type 3D germination) on a SiC substrate, with a high crystal density which makes it possible to obtain a coalescence of the crystals and then the formation of a film via appropriate growth conditions. Consequently, the combined Yoder and Dreifus teachings do not suggest forming a monoatomic and monocrystalline layer of diamond-type carbon.

In both Yoder and Dreifus, there is no suggestion of forming a monoatomic and monocrystalline layer of

diamond-type carbon having a  $sp^3$  configuration. As particularly set forth in claim 5, there is no suggestion in the applied art of transforming a plane of carbon having a  $sp$  configuration into a  $sp^3$  plane. In comparison, the prior art teaches only forming a film on a substrate by bringing matter thereto. Accordingly, the prior art teachings relate to nucleation and growth, not the phenomenon of the invention linked with transformation of the carbon hybridization on the last atomic layer of a specially prepared SiC substrate.

For all of the foregoing reasons, the claim rejections set forth in paragraphs 1 - 4 of the Office action are in error and should be withdrawn.

The rejection of the claims 1, 2, 4-6 and 8-11 under 35 USC 103(a) as unpatentable over Powers et al. in view of Liu et al. (5,516,500) is in error and should be withdrawn.

Powers et al. is referenced as document (12) at page 7 of the subject application. Powers et al. relates to a  $c(2 \times 2)$  surface of cubic SiC (100) which is terminated by a plane of  $sp$  type carbon (acetylene), and not a plane of  $sp^3$  type carbon (diamond) as in the subject application. The Powers et al. method consists of preparing the  $c(2 \times 2)$  surface by either (1) eliminating the monoatomic layer of  $(2 \times 1)$  Si which covers the first plane of carbon using a

heat treatment or (2) carburizing this monoatomic Si layer of 2x1 configuration by cracking a hydrocarbon.

The deficiencies of Powers et al. are not remedied by Liu et al. In fact, the Liu et al. teaching is completely different from the present invention since the former uses a totally different method to achieve a different result. In Liu et al. there is no substrate and there is no monoatomic and monocrystalline layer of diamond-type carbon.

The further rejection of claims 3, 7 and 12-14 based on Powers et al. and Liu et al. as combined above and further in view of Kackell et al. is in error for the same reasons noted above.

For all of the foregoing reasons, claims 1-14 are in condition for final allowance and such action is requested.

Attached hereto is a marked-up version of the changes made to the claims by this Amendment.

If there are any further fees required by this communication not covered by an enclosed check, or if no check is enclosed, please charge the same to Deposit Account No. 16-0820, Order No. 33585.

Respectfully submitted,

By:   
Joseph J. Corso, Reg. No. 25845

Pearne & Gordon LLP  
526 Superior Avenue East  
Suite 1200  
Cleveland, Ohio 44114-1484

(216) 579-1700

December 16, 2002

Version with Markings to Show Changes Made

U.S. Serial No. 09/856,211  
Applicant: Vincent Derycke et al.

IN THE CLAIMS:

The claims have been amended as follows:

1           2. (Twice amended) Monoatomic and monocrystalline  
2 layer according to claim 1, the SiC monocrystalline  
3 substrate being a thin layer of monocrystalline SiC in  
4 cubic phase  $\beta$ -SiC (100) formed on a platelet of Si, the  
5 monoatomic and monocrystalline layer thus closely  
6 covering the totality of this platelet.

1           6. (Twice amended) Process according to claim 5, in  
2 which the SiC monocrystalline substrate is prepared from  
3 a thin layer of monocrystalline SiC in cubic phase  $\beta$ -SiC  
4 with a face (100) terminated by a layer of Si.

1           7. (Twice amended) Process according to claim 5, in  
2 which the SiC monocrystalline substrate is prepared from  
3 a monocrystalline SiC platelet in hexagonal phase with a  
4 face (1000) terminated by a layer of Si.

1           11. (Twice amended) Process according to claim 5,  
2 in which, to transform the plane of carbon-carbon dimers  
3 of sp configuration into a plane of carbon-carbon dimers  
4 of sp<sup>3</sup> configuration, one carries out an annealing or a

5 plurality of successive annealings, at a temperature  
6 approximately equal to [1250 C] 1250°C, of the  
7 monocrystalline substrate in SiC terminated by the atomic  
8 plane of carbon according to the reconstruction c(2x2),  
9 the total time of annealing being greater than or about  
10 equal to 25 minutes.

1 12. (Amended) Process according to claim 7, in  
2 which, to obtain [to] the atomic plane of carbon  
3 according to the reconstruction c(2x2), an annealing is  
4 carried out capable of eliminating the layer of Si.